daeg ⋈ SPO2 Simulator
User Manual

Version 1.15_2
Updated 22/01/2007

Warranty and Product Support

Fluke Biomedical warrants this instrument against defects in materials and workmanship for one full year from the date of original purchase. During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective, provided you return the product, shipping prepaid, to Fluke Biomedical. This warranty does not apply if the product has been damaged by accident or misuse or as the result of service or modification by other than Fluke Biomedical. IN NO EVENT SHALL FLUKE BIOMEDICAL BE LIABLE FOR CONSEQUENTIAL DAMAGES.

Only serialized products and their accessory items (those products and items bearing a distinct serial number tag) are covered under this one–year warranty. PHYSICAL DAMAGE CAUSED BY MISUSE OR PHYSICAL ABUSE IS NOT COVERED UNDER THE WARRANTY. Items such as cables and nonserialized modules are not covered under this warranty.

Recalibration of instruments is not covered under the warranty.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state, province to province, or country to country. This warranty is limited to repairing the instrument to Fluke Biomedical's specifications.

Warranty Disclaimer

Should you elect to have your instrument serviced and/or calibrated by someone other than Fluke Biomedical, please be advised that the original warranty covering your product becomes void when the tamper-resistant Quality Seal is removed or broken without proper factory authorization. We strongly recommend, therefore, that you send your instrument to Fluke Biomedical for factory service and calibration, especially during the original warranty period.

Notices

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Unpacking and Inspection

Follow standard receiving practices upon receipt of the instrument. Check the shipping carton for damage. If damage is found, stop unpacking the instrument. Notify the carrier and ask for an agent to be present while the instrument is unpacked. There are no special unpacking instructions, but be careful not to damage the instrument when unpacking it. Inspect the instrument for physical damage such as bent or broken parts, dents, or scratches.

Technical Support

For application support or answers to technical questions, either email techservices@flukebiomedical.com or call 1-800- 648-7942 or 1-425-446-6945.

Claims

Our routine method of shipment is via common carrier, FOB origin. Upon delivery, if physical damage is found, retain all packing materials in their original condition and contact the carrier immediately to file a claim. If the instrument is delivered in good physical condition but does not operate within specifications, or if there are any other problems not caused by shipping damage, please contact Fluke Biomedical or your local sales representative.

Standard Terms and Conditions

Refunds and Credits

Please note that only serialized products and their accessory items (i.e., products and items bearing a distinct serial number tag) are eligible for partial refund and/or credit. Nonserialized parts and accessory items (e.g., cables, carrying cases, auxiliary modules, etc.) are not eligible for return or refund. Only products returned within 90 days from the date of original purchase are eligible for refund/credit. In order to receive a partial refund/credit of a product purchase price on a serialized product, the product must not have been damaged by the customer or by the carrier chosen by the customer to return the goods, and the product must be returned complete (meaning with all manuals, cables, accessories, etc.) and in "as new" and resalable condition. Products not returned within 90 days of purchase, or products which are not in "as new" and resalable condition, are not eligible for credit return and will be returned to the customer. The Return Procedure (see below) must be followed to assure prompt refund/credit.

Restocking Charges

Products returned within 30 days of original purchase are subject to a minimum restocking fee of 15 %. Products returned in excess of 30 days after purchase, but prior to 90 days, are subject to a minimum restocking fee of 20 %. Additional charges for damage and/or missing parts and accessories will be applied to all returns.

Return Procedure

All items being returned (including all warranty-claim shipments) must be sent freight-prepaid to our factory location. When you return an instrument to Fluke Biomedical, we recommend using United Parcel Service, Federal Express, or Air Parcel Post. We also recommend that you insure your shipment for its actual replacement cost. Fluke Biomedical will not be responsible for lost shipments or instruments that are received in damaged condition due to improper packaging or handling.

Use the original carton and packaging material for shipment. If they are not available, we recommend the following guide for repackaging:

- Use a double–walled carton of sufficient strength for the weight being shipped.
- Use heavy paper or cardboard to protect all instrument surfaces. Use nonabrasive material around all projecting parts.
- Use at least four inches of tightly packed industry-approved, shock-absorbent material around the instrument.

Returns for partial refund/credit:

Every product returned for refund/credit must be accompanied by a Return Material Authorization (RMA) number, obtained from our Order Entry Group at 1-800-648-7952 or 1-425-446-6945.

Repair and calibration:

To find the nearest service center, go to www.flukebiomedical.com/service or

In the U.S.A.:
Cleveland Calibration Lab
Tel: 1-800-850-4606
Email: globalcal@flukebiomedical.com

Everett Calibration Lab
Tel: 1-800-850-4606
Email: service.status@fluke.com

In Europe, Middle East, and Africa:
Eindhoven Calibration Lab
Tel: +31-402-675300
Email: ServiceDesk@fluke.com

In Asia:
Everett Calibration Lab
Tel: +425-446-6945
Email: service.international@fluke.com

Certification

This instrument was thoroughly tested and inspected. It was found to meet Fluke Biomedical's manufacturing specifications when it was shipped from the factory. Calibration measurements are traceable to the National Institute of Standards and Technology (NIST). Devices for which there are no NIST calibration standards are measured against in-house performance standards using accepted test procedures.

WARNING

Unauthorized user modifications or application beyond the published specifications may result in electrical shock hazards or improper operation. Fluke Biomedical will not be responsible for any injuries sustained due to unauthorized equipment modifications.

Restrictions and Liabilities

Information in this document is subject to change and does not represent a commitment by Fluke Biomedical. Changes made to the information in this document will be incorporated in new editions of the publication. No responsibility is assumed by Fluke Biomedical for the use or reliability of software or equipment that is not supplied by Fluke Biomedical, or by its affiliated dealers.

Manufacturing Location

The daeg is manufactured in Norway for Fluke Biomedical, Everett, WA, U.S.A.

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daeg Specifications

SPO2 SIMULATION

GENERAL
- Factory installed, downloadable and user programmable R-curves, patient conditions and templates.
- Probe signal and LED test

ACTIVE PROBE SPO2 SIMULATION
- O2 saturation range: 35 – 100 %
- Simulation resolution: 1% SpO2%
- Simulation accuracy:
  ± 0.5 SpO2% 65-100% SpO2%
  ± 1 SpO2% 30-64% SpO2%
- Simulation repeatability: ± 0.2 SpO2%
- Simulation rate: 30 – 300 bpm
- Rate resolution: 5 bpm (sync. to ECG for "C-lock" testing)
- Rate accuracy: ± 0.1%
- Pulse amplitude 0 – 100% of nominal pleth amplitude.
- Amplitude resolution: 0-10 range, 1%
  10-100 range, 5%
- Amplitude accuracy: ≥30% amplitude ±1%.
  1-29% amplitude ±5%.
- Pigmentation: Low, medium and high
- Light repeater bandwidth:
  DC – 1MHz
- Optical slew rate: 50 mcd/µs
- Light repeater dynamic range:
  1mcd + 13 dB – 60 dB
- Receiver optical 3 dB bandwidth:
  600 – 1050 nm.

INSTALLED R-CURVES
- BCI Oxipuls
- Criticare
- Nellcor
- HP
- Ohmeda

ADDITIONAL R-CURVES
These are R-Curves that are available and can be uploaded using the PRO-Soft **daeg** software.

- BCI Oxipulse 3301
- Criticare 504
- Dolphin 2100
- HP/Philips
- Massimo
- Nellcor N-20, N-180, N-200, NBP-40, Symphony
- Nonin 8500 & Marquette Apex
- Novametrix Oxypleth
- Ohmeda 3700, 3740
- Welch Allen Propaq

INSTALLED PATIENT CONDITIONS
- Normal patient
- Geriatric patient
- Obese patient
- Patient with weak pulse
- Bradycardia
- Tachycardia

ARTIFACTS (ACTIVE PROBE ONLY)
- Motion: 0 - 4Hz
- Ambient sunlight: Ambient, Sun
- Interfering light: 50Hz, 60Hz

PROBE LED OPTICAL FREQUENCY
- Frequency range: 550 – 1050 nm
- Resolution: 1nm
- Accuracy: ±2% of range

PROBE TEST

Available with PTA-1 Probe Test Adapter Box - Tests cable, photo sensors, Red LED and IR LED.

- Interface for Nellcor and Ohmeda type sensors as standard.
- Adapters for most major manufacturers available.

- LED current continuity tests.
- Photodiode response test with numerical display of light transfer function, 0-100%
- Advance cable test by detecting response glitches when flexing the cable.

ECG SIMULATION - GENERAL

The data below is related both to factory installed and downloadable waveforms.
- Lead configuration:
  5 lead RL, RA, LA, LL, V1-6
- Low level output amplitude:
  0.2-2mV, resolution 100 µV
- Low level output impedance:
  1000 ohm to RL
- High level output amplitude:
  0.5V/mV of low level.
- High level output impedance: 50 ohm
- System amplitude accuracy: ±2% @1mV
- System rate accuracy: ± 0.1%
- System time resolution: 10 µs
  (100 kHz maximum update rate)

ECG OUTPUT

The data below is related to factory installed waveform types.
NORMAL ECG SINUS
30 – 300 BPM, resolution 5 BPM
(synchronized with pleth wave)

ACCESSORIES

- Battery Eliminator 240V or 115V
- Batteries
- User/Service Manual

OPTIONS

- PTA-1 Probe Test Adapter Box
- SpO2 Probe Adapters (check availability)
- Carrying case
- Universal Snap-to-Banana Adapters

GENERAL INFORMATION

POWER SUPPLY
- Power sources: 4 standard AA/LR6/MN-1500 cells.
  230VAC/115VAC to 9vDC battery eliminator.
- Power consumption:
  200 mA w/o display backlight.
  400 mA w/full backlight.
- Battery lifetime:
  12 h for alkaline cells without backlight.

HOUSING
High impact plastic case.

DIMENSIONS
- Height: 237 mm/9.2"
- Width: 122 mm/4.8"
- Depth: 42 mm/1.6"

WEIGHT
With battery: 0.6 kg/1.3 lb

TEMPERATURE
- Storage temperature:
  0/32 to +50/122 ° C/F
- Operating temperature:
  + 15/59 to +35/95° C/F

HUMIDITY
Operating humidity:
10% - 80% (non-condensing)

DISPLAY
Graphical LCD, with backlighting.

CONNECTORS
- 9V DC power inlet (standard 2.1 mm power jack.
- RS-232/C for PC or printer communication (9-pin D-sub male)
- 1 probe connector (Redel 8-pin).
- 5 low level ECG outputs RA, RL, LA, LL and V1 (AHA color coded safety connector)
- 1 high level ECG output (standard phono jack).

RECOMMENDED PRINTERS
HP DeskJet, Canon Bubble Jet or compatible.

daeg SpO2 Analyzer Ordering Information

Order no:
12700: ***daeg*** SpO2 Analyzer

Accessories:
12715: Finger Probe AFP-1
17030: Battery Eliminator *daeg*, 240V
or
17027R: Regulated Battery Eliminator 115V
17031: Battery package, 4-cells
12710: User and Service Manual (CD)

Options:

11150: Carrying case
12711: Probe Test Adapter Box
12712: PRO-Soft ***daeg***
12713: PRO-Soft ***daeg***, demo
12714: User Manual PRO-Soft ***daeg***
17024: Universal Banana Adapter

SpO2 Probe Adapters
12761: BCI Compatible Direct SpO2
12761N: BCI Compatible 9-Pin SpO2
12762: Criticare Compatible Direct SpO2
12762N: Criticare Compatible 9-Pin SpO2
12764: Datascope Compatible Direct SpO2
12764N: Datascope Compatible 9-Pin SpO2
12765: Datex Compatible Direct SpO2
12765N: Datex Compatible 9-Pin SpO2
12766: Philips Compatible Direct SpO2
12767: Invivo Compatible Direct SpO2
12768: Nihon Kohden Compatible Direct SpO2
12769: Nonin Compatible Direct SpO2
12770: Novametrix Compatible Direct SpO2
12773: Simed Compatible Direct SpO2
12774: Spacelabs Compatible Direct SpO2
12775: Sensormedics Compatible Direct SpO2
12776: Masimo Compatible Direct SpO2

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daeg Quick Start

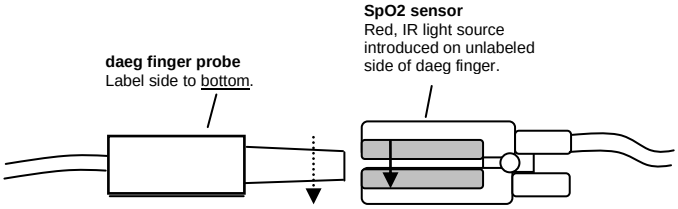
daeg Startup

1. Connect daeg's Finger Probe to the main daeg unit, and switch the daeg unit **on**.

   The daeg must be powered by the 9VDC 400mA power supply or by 4 AA alkaline batteries loaded into the unit's battery compartment.

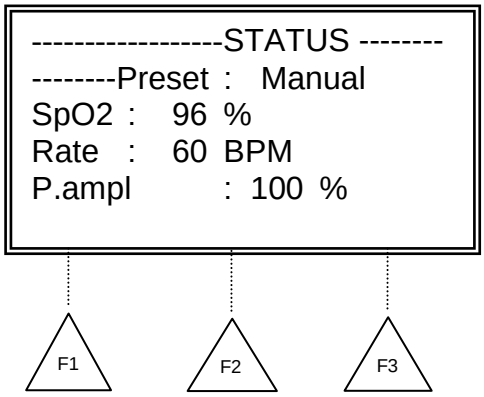
2. The version number of the firmware will be briefly displayed, followed by the first display screen (below). The unit is immediately outputting the simulation as displayed.

3. Apply the oximeter's sensor to the daeg finger probe. The sensor's transmitter must be on the bottom (unlabeled) side of the daeg finger.



Daeg Operation / Simulation

1. To adjust the simulation settings, use the **F2** function key to select the "active" parameter. The active parameter is marked with an asterisk (*).



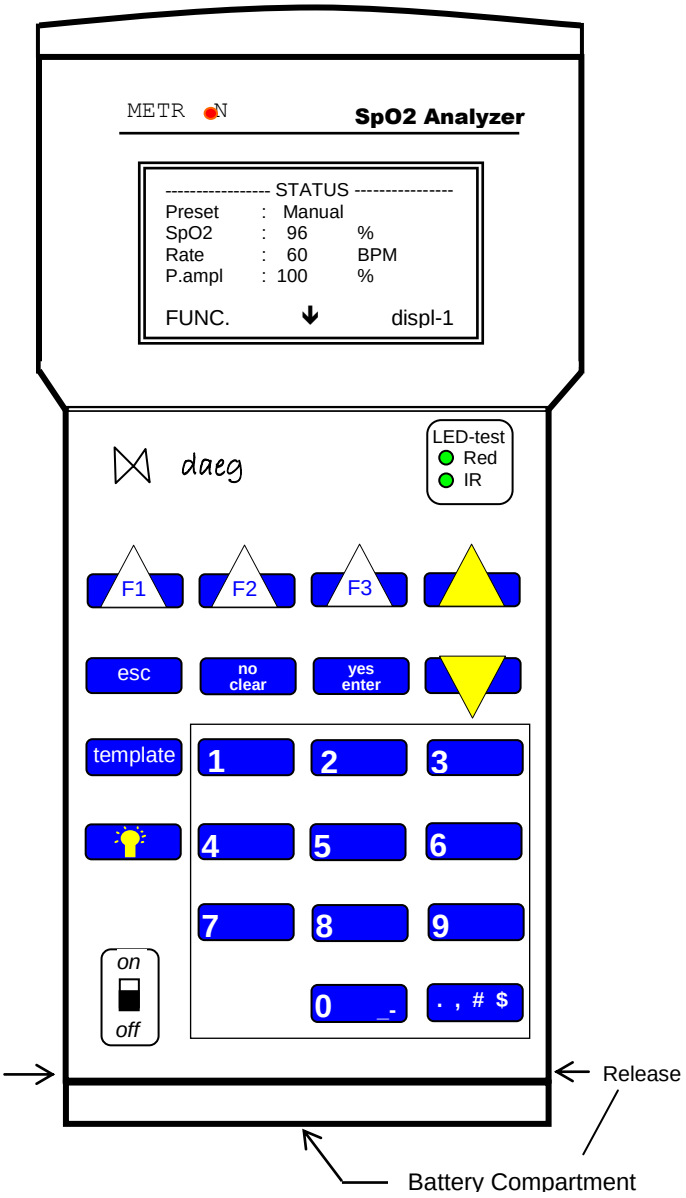
Note: Menu items at the bottom of the display are activated/accessed using the F1, F2, and F3 function keys.

2. Adjust the active parameter using the yellow Up and Down arrow keys on the keypad, then press **enter** to confirm the change.

3. To change the simulation setting for oximeter model (Make), Ambient Light, Pigmentation, or to select an automated simulation sequence, select the **F3** function key to go to the second display screen.

4. To access additional test and auxiliary functions, press the **F1** function key while in the first or second screen display.

   Additional / Auxiliary functions include:
   Alarm Tests, Print functions, Remote Control Operation, Probe Tests, and Simulation Setup.



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Unit Setup

Unpacking

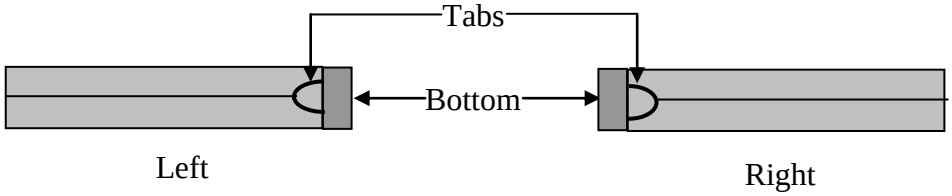
Unpack the unit and confirm the presence of the following components:

1 - daeg main unit
1 - daeg artificial finger
4 - AA batteries
1 – battery eliminator

If any of these items are missing or damaged, please contact your local Metron office.

Battery Installation

Refer to the diagram below when installing the batteries. You will need to depress the tabs shown in the diagram below and remove the bottom dark gray piece of the chassis. This will then expose the battery connector and battery tray. Disconnect the battery clip and remove the battery tray. When inserting the batteries into the tray, be sure to observe the polarity of the batteries. When the tray is loaded back into the unit, reconnect the clip, and then replace the chassis piece.



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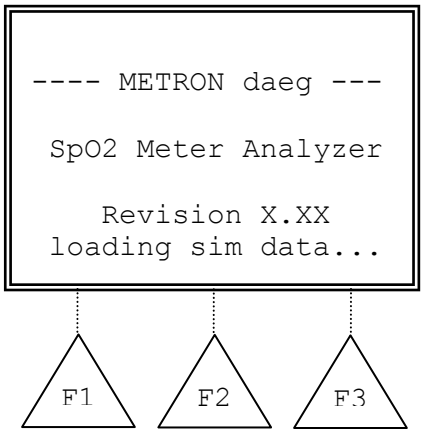
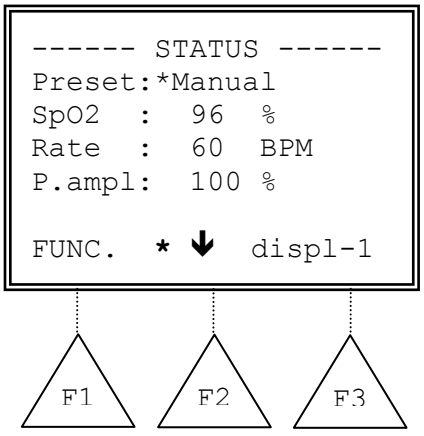
Operation

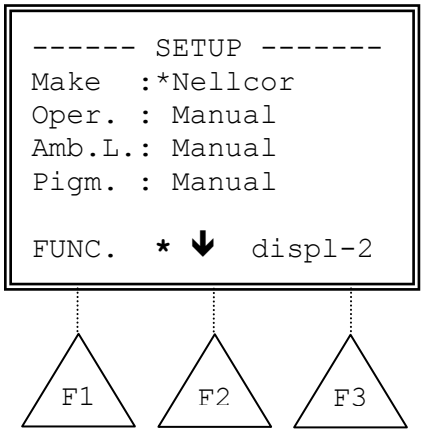
Power up Screen



This screen is the first one that is visible when the unit is turned on. It indicates which version of the firmware is installed.

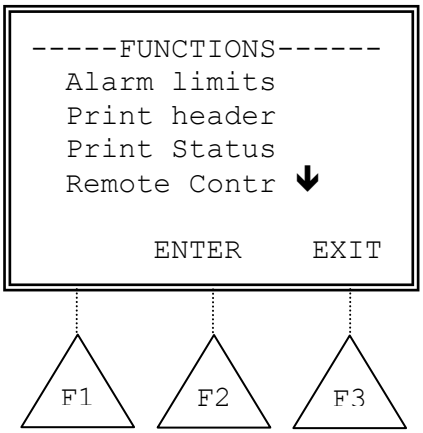
Main Simulation Screens



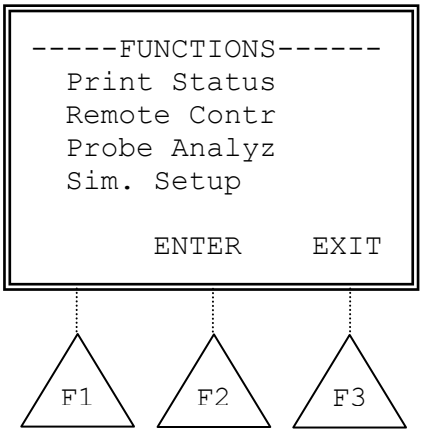


These are the two screens that are used when performing SPO2 simulations. You can change between the screens by pressing the (**F3**) button. The (**F2**) button will move the cursor, (*****), to the next parameter. Using the Up and Down arrows will let you change the value of the selected parameter. You will then need to press the (**yes/enter**) button to accept the change. Pressing the (**F1**) button will take you the **Function Selection Menu**.

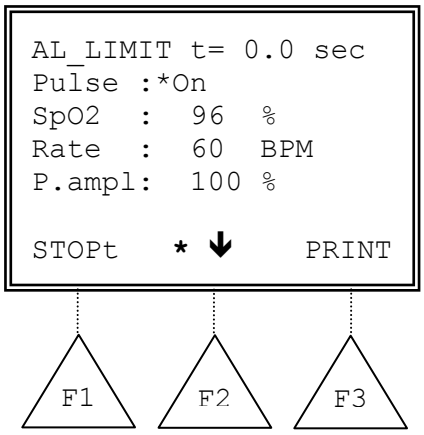
Function Selection Menu



This screen will let you select which testing function of the daeg that you wish to perform. Using the **Up** and **Down** arrows will let you move the cursor (->) next to the function that you wish to use. Once the cursor is placed press the (**F2**) button or the (**yes/enter**) button to enter that function. Pressing the (**F3**) or (**esc**) buttons will take you back to the **Main Simulation Screen**.

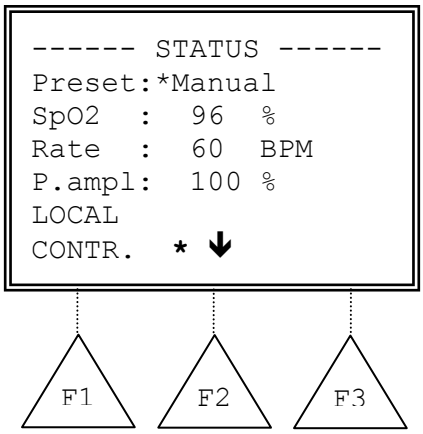


Alarm Limits



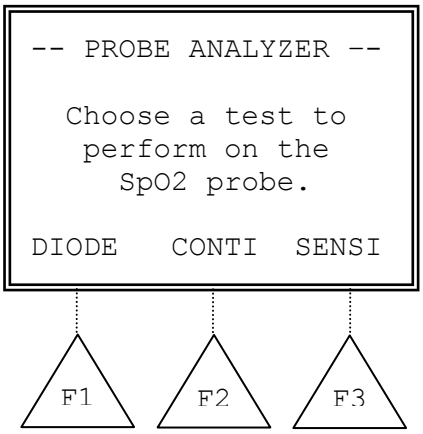
This test is designed to test your alarm system on your monitor. The (**F2**) button will move the cursor, (*****), to the next parameter. Using the Up and Down arrows will let you change the value of the selected parameter. You will then need to press the (**yes/enter**) button to accept the change and start the timer. Press the (**F1**) button to stop the clock when you hear the alarm from your monitor. The (**F3**) button will generate a line of printout via the parallel port. Pressing the (**esc**) button will take you back to the **Main Simulation Screen**.

Remote Control



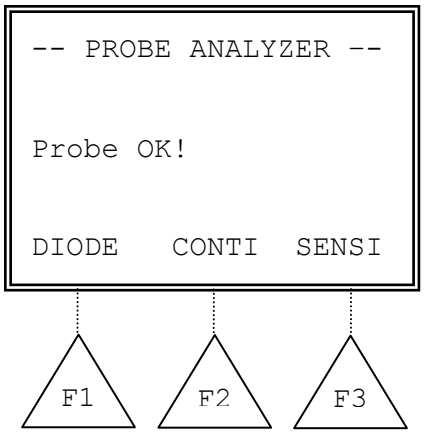
This is the screen that is shown when the daeg is in remote control mode. All currently active parameters are displayed on the screen. Pressing (**F1**) will cancel the remote control mode and take you back to the local **Main Simulation Screen**.

Probe Analyzer



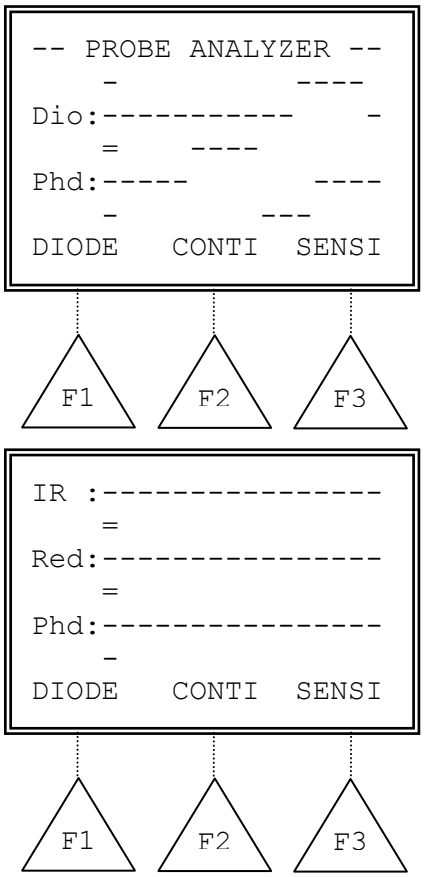
This screen will let you select which test you wish to perform on the finger probe when you have the probe tester adaptor box attached.

Diode Test



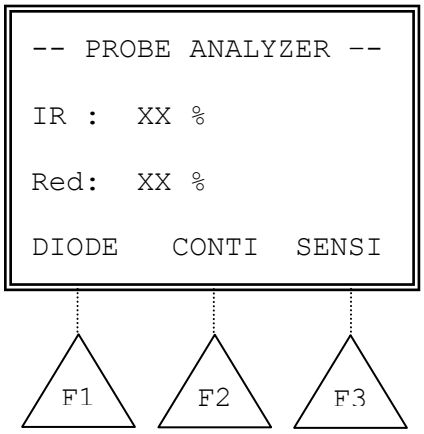
Pressing (**DIODE**) runs the test.
This test gives a descriptive message as to the condition of the probe's LEDs and sensing elements. It tests the probe for electrical shorts and open circuits.

Continuity Test



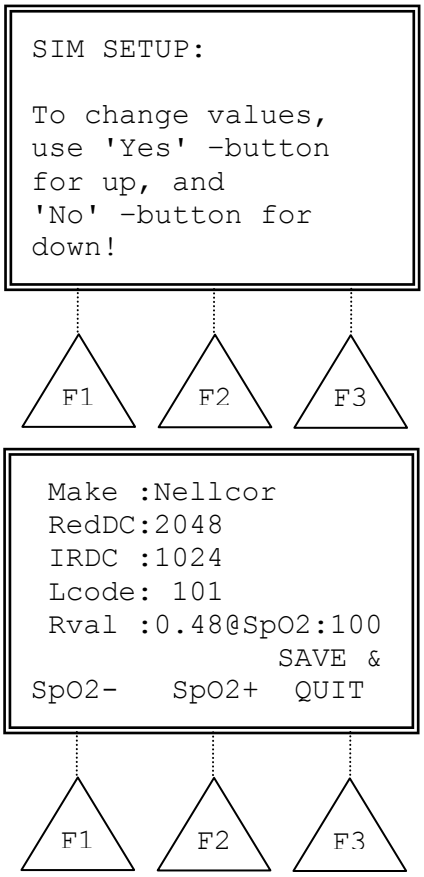
Pressing (**CONTI**) starts the continuity test. This test constantly monitors the LED's and the photocell. Depending on the nature of the probe you will either have "**Dio**" and "**Phd**" or "**IR**", "**RED**", and "**Phd**" status lines. This is a continuous test and will display changes in the status in real time. If the status changes this will be reflected on the graph. A "**High**" line indicates a short in that element. A "**Middle**" line is normal operation. A "**Low**" indicates an open circuit. Since this is a continuously running test it lets you flex you cable to check for intermittent failures.

Sensitivity Test



Press (**SENSI**) to start the sensitivity test. This test gives a value for the **Red** and IR light being seen by the sensor. The scale is from 0 – 100. For repeatability purposes, do not hold your probe open or squeeze it shut. Just let it rest in its normal position.

Simulation Setup



This function lets you manually alter the R-Curves within the daeg unit.

Be cautious when using this mode as you are altering the simulator output. If you make any changes that you do not wish to keep you must turn off the daeg for 5 seconds then turn it back on.

When in this mode the controls will be as follows:
Up and **Down** arrows control the cursor position.
(**yes/enter**) increases the indicated value.
(**no/clear**) decreases the selected value.
(**F1**) decreases the selected SPO2 value.
(**F2**) increases the selected SPO2 value.
(**F3**) Saves the changes and takes you back to the **Main Simulation Screen**.

The saving procedure may take up to 5 minutes. Do not turn off the power during this time.

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Troubleshooting

Q: SPO2 values do not match.
A: Confirm that the “Make” is properly selected. Confirm your selection by pressing the (**ENTER**) key after changing the value.

Q: The monitor is not reading any values.
A: Check all connections and verify if the “Red” and “IR” lights on the daeg are illuminated.

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